CENTRAL INTELLIGENCE AGENCY

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50X1-HUM

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50X1-HUM

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50X1-HUM

SUMMARY OF WORK WITH T-STOFF AT ZAVOD No. 1

1. None of the specialists in the chemical section at Podberezye had ever become acquainted with T-Stoff (80 per cent hydrogen peroxide), as such, before being assigned to work with it by the Soviets. Some work had been done in the special office set up by the Soviets at Halle in the Siebel plant prior to the group's departure for the USSR in 1946. A large laboratory had been built for this purpose and the first experiments with T-Stoff and C-Stoff were made there. Both of these substances were received from the Brande warehouse which had formerly been a storage depot for the German army. When the Siebel group was taken to the USSR, the laboratory was moved with them.

2. Some of the first duties assigned at Podberezye were in connection with analyses and attempts to stabilize concentrated hydrogen peroxide. Work began about the middle of 1947 and lasted until the end of 1950 because experiments with the 346 aircraft were going on at this time. The request for these tests did not come from the Soviets directly and there were no real development orders given. The work which was done was in connection with the 346 and upon request from the German group conducting propulsion studies.

SECRET

SECURITY INFORMATION

50X1-HUM

3. During the first few months of testing, the T-Stoff was supplied from captured stocks and had a concentration of about 78 per cent. It was used primarily for testing engines. Because there were no papers or experts on T-Stoff available to the group, educational experiments had to be made first in order to gain basic knowledge and to establish a criterion for analysis. Later, about 1949/1950, a regulation concerning T-Stoff production and analysis was published. The required concentration was set at 82 per cent minimum. The percentage content of hydrogen was to be determined by the usual analytical method, i.e., titration in sulfuric acid solution with potassium permanganate. By way of estimation the specific gravity was determined.

4. According to this standard specification, the phosphorous content was also required, as well as the dry residue of the T-Stoff. A standard chemical method was used, employing the precipitation of the phosphorous as ammonium phosphomolybdate. For the dry residue, the method outlined by the specification stipulated that the T-Stoff be decomposed in a platinum dish, but platinum ware was never made available to the chemical laboratory.

PACKING MATERIALS FOR T-STOFF AND C-STOFF

5. Research on packing materials was done through the period 1947-1949. Standard, good quality, rubber was sufficient for C-Stoff, but special material for packing and tubing was required for T-Stoff. At the beginning, the group used several rubber mixtures based on Buna-S, which were especially developed for the purpose, but these did not work out and in my opinion caused many of the failures of the Walther engine.

6. Only packing materials based on oppanol-lupolen proved to be suitable. Good mixtures contained either 70 parts oppanol and 30 parts lupolen or 50 parts oppanol and 50 parts lupolen, according to the degree of hardness desired. These mixtures were produced by the rolling mill at about 160°C. Plates and some molded articles were also manufactured. Folded bellows were also to have been made according to a special procedure, i.e., upon cores which were cast from a mixture of potassium nitrate and sodium nitrate. Parts were supposed to be molded from 50:50 oppanol-lupolen mixture, following which, the cores of salt mixture were to be dissolved with water. This was necessary because parts made from the oppanol-lupolen mixture could not have been separated from a steel molded core due to their inflexibility.

50X1-HUM

7. The pipes described herein were made from a 90 parts mixture of oppanol with 10 parts lupolen. Plates were pressed from this mixture, twisted on spikes and covered with PVC tissue which was then brushed many times with oppanol solution (PVC-polyvinylchloride). This was done for simple socket tubes. Also, a special tube was developed for taking samples of T-Stoff from the tanks of the 346. It was a so-called "pivoting tube." This consisted of an inner and outer wire spiral of non-rusting steel wire and layer of PVC tissue, which was brushed with oppanol. This was supposed to make

50X1-HUM

it possible to achieve the flexibility necessary for drawing off the T-Stoff in all flying positions. This tube was produced, met the requirements, but [redacted] was not installed. In addition, a tank tube was produced consisting of an aluminum spiral covered with two layers of PVC tissue which were brushed with oppanol solution. On top of this was a plate with oppanol-lupolen 90:10, followed by another two layers of PVC tissue which was again brushed with oppanol solution. Another aluminum spiral was placed on the outside. The connections for these tubes were made of aluminum castings.

50X1-HUM

8. A solution of about 3 - 4 per cent oppanol in benzine was used for painting. That was light gasoline, boiling point 80° - 100°. The tissue was temporarily saturated with this solution, then allowed to dry. This process was repeated about four to six times. This thickness of the layer on the tissue depended on the tissue, which was PVC material. Two or more layers were used. The end of the tank tube was especially made to prevent the T-Stoff from oozing through the tissue layers. The lower layer of tissue was interrupted by an oppanol layer so that the tensile stress was only taken up by the PVC tissue layer. The oppanol layer was merely supposed to seal it. This tank tube was also provided with so-called protective "eggs" from cast aluminum caps which were supposed to protect it against wear when the tank tube was drawn across concrete surfaces. These caps were attached at intervals of about 3/4 of a meter and fastened together with aluminum wire after the two shells had been drawn over the tube. The aluminum connections were provided with packing seals of 50 parts oppanol and 50 parts lupolen.

9. In addition, solutions with approximately three per cent oppanol in benzine were used for sealing metal-to-metal contact surface in which no packing was supposed to be used (for example, pumps where the surfaces are supposed to meet one another exactly and no soft packing could be used). This oppanol solution was put in between; only in this manner could an exact sealing be achieved since these two surfaces could never lie 100 per cent in a parallel plane. As already mentioned, the usual qualities were sufficient for C-Stoff. However, with T-Stoff, the rubber is strongly affected after an extended period of use and this naturally led to losses. The rubber partially decomposed and small particles would break off and get into the line, causing decomposition of the T-Stoff. Therefore, rubber could not be considered resistant in the long run. At the phase boundary, particularly liquid-to-air, there is an especially strong and quick decomposition of the T-Stoff as a result of the formation of active oxygen. This rubber problem was a difficult one, and it had to be first worked out for a rubber company.

50X1-HUM

10. [redacted] The Soviets had their own asbestos; it was always easy to get and in plentiful supply.

50X1-HUM 50X1-HUM

11. At first the laboratory at Podberezye used German T-Stoff, but from 1950 on [redacted] used Soviet T-Stoff . [redacted] had a sufficient supply of T-Stoff. It was brought to Podberezye in a tank car, [redacted] (There is a factory in the wooded area across the Volga river, near Novoye Ivan'Kovo, [redacted] frequently heard arms firing from that location and surmised that it was either a munitions or arms factory.) A tank car of aluminum would have held 2000-3000

50X1-HUM

50X1-HUM

50X1-HUM 50X1-HUM

50X1-HUM

liters. It was a German aluminum container and tank car.

STORAGE AND STABILIZATION OF T-STOFF

12. According to consumption, the Soviet T-Stoff was delivered constantly, and then later also for the flight test. The real flight test with the 346 did not take place in Podberezye, but in Lukhovitsy (N 54-59, E 39-02) south of Moscow in the vicinity of Kolomna. A large airfield was built there which was not yet finished and an experimental flight station was erected under very primitive circumstances (everything was only in tents). The laboratory was built half in the earth. The T-Stoff was stored there also and delivered regularly still in German aluminum containers. The T-Stoff which was brought there kept very well because these containers lay half in the ground, were always kept well cooled by water sprays and thus had very good temperature control. The material changed hardly at all in 3/4 of a year. at least 6 to 10 tons of T-Stoff were stored here.

50X1-HUM

50X1-HUM

13. There was a very exact regulation requiring the container to be cleaned before it was filled with T-Stoff. As stated before, the containers were stored deep and if the outer temperature exceeded a certain degree, they were cooled from the outside by water. The temperature had to be checked at certain intervals, even on Sundays. If the temperature in the container reached a certain degree, there was a container next to it which contained clean, distilled water. This water had to be pumped over to dilute the T-Stoff. In addition, the T-Stoff had to undergo a test for stability when it was stored. The T-Stoff was warmed for 24 hours to 94° in a special device which made it possible to withdraw T-Stoff samples (without opening the device) by low atmospheric pressure. After 12 - 24 hours the hydrogen content was checked in the usual way by titration with potassium permanganate. The decrease after 24 hours had to be less than three per cent.

14. The glass device for this stability test had to be cleaned beforehand with 98 per cent nitric acid and was evacuated for several hours after this in order to remove impurities. The original regulation provided for cleaning with sulfuric acid-bi-chromate solution. This kind of cleaning proved unsatisfactory because a small amount of chromium was absorbed by the glass wall, which later decomposed the T-Stoff catalytically and resulted in values which were too high.

15. The T-Stoff, which was stored at Lukhovitsy in the previously mentioned pure aluminum containers in the earth and at constant temperatures, had practically no change in its values during its storage for 3/4 of a year. The storage conditions in Podberezye were less satisfactory, especially in summer. The containers were constantly cooled with water. It once happened that small amounts of cold water which contained ice got into the container and that one container decomposed. The decomposition was relatively slow, so that by dilution with water, the decomposition was not dangerous. In such cases, if the decomposition was not stopped by dilution, the T-Stoff was pumped into open air receptacles.

16. Experiments were also made to stabilize the T-Stoff with hydroxyquinoline. It was necessary to dissolve the hydroxyquinoline beforehand in diluted sulfuric acid, to mix this solution with small

50X1-HUM

amounts of T-Stoff, and to add this diluted hydroxyquinoline-sulfuric acid solution to the whole quantity of T-Stoff. This method was successful in stabilizing T-Stoff which did not meet the stability test outlined above. Hydroxyquinoline is well known as a stabilizer for T-Stoff. The concentration of the hydroxyquinoline used was under 0.2 or 0.1 per cent. Very low concentrations suffice.

50X1-HUM

Apparently the problem of the stabilization with hydroxyquinoline was not pleasant for the Soviets, or they had had difficulties with it. It seemed to be something new for them and For some reason they would not agree. It may be that the addition of sulfuric acid caused some corrosion in the containers and that is why they were reluctant to use it.

50X1-HUM

50X1-HUM